

## Thermo-optic switch based on silicon photonic crystal waveguides

T. Chu<sup>1</sup>, H. Yamada<sup>1,2</sup>, S. Ishida<sup>3</sup>, Y. Arakawa<sup>3</sup>,

1. OITDA, 34, Miyukigaoka, Tsukuba, 305-8501, Japan.

2. Fundamental and Environmental Res. Labs., NEC Corp., 34, Miyukigaoka, Tsukuba, 305-8501, Japan.

3. NCRC, IIS, Univ. of Tokyo, Komaba, Meguro-ku, Tokyo, 153-8505, Japan.

A Mach-Zehnder(MZ) interferometer type thermo-optic switch based on silicon 2-dimensional photonic crystal (PhC) slab waveguide was demonstrated. The device consists of two PhC W1-line-defect waveguides connecting with Y-splitters made of silicon-wire waveguides. The PhC structure was specially designed with vertically symmetric upper and lower silica cladding layers. The device area size is  $160 \times 65 \mu\text{m}^2$ , excluding the heater electrode pads. The switching operation was realized by thermally controlling the refractive Index of one PhC waveguide of the MZ interferometer. At 1550-nm wavelength, more than 30 dB of extinction ratio was obtained at 120-mW heating power. The optic switching on/off response speeds were both about 120  $\mu\text{s}$ . The switching bandwidth was more than 15 nm, when the extinction ration was over 30 dB. This work was supported by IT Prog., MEXT and Photonic Network Proj., NEDO.

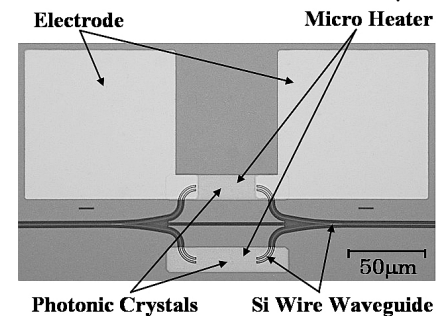


Fig.1:PhC thermo-optic switch.